

# Часть 1

Олимпиада: **Математика, 11 класс (1 часть)**

Шифр: **21101047**

ID профиля: **207637**

Вариант 22

Математика, 11 класс Числовые множества.

$$a_7 = a_1 + 6d; \quad a_{16} = a_1 + 15d; \quad a_{11} = a_1 + 10d; \quad a_{12} = a_1 + 11d$$

$$\begin{cases} (a_1 + 6d)(a_1 + 15d) > S - 24 \\ (a_1 + 10d)(a_1 + 11d) < S + 4 \end{cases}$$

$$\begin{cases} a_1^2 + 21a_1d + 90d^2 > S - 24 \\ a_1^2 + 21a_1d + 110d^2 < S + 4 \end{cases}$$

$$\begin{cases} a_1^2 + 21a_1d + 90d^2 > S - 24 \\ -a_1^2 - 21a_1d - 110d^2 > -S + 4 \end{cases}$$

$$-20d^2 > -28$$

$$d^2 < \frac{28}{20}$$

$$a_1, a_2, a_3 \dots \in \mathbb{Z} \Rightarrow d \in \mathbb{Z} \Rightarrow d = 1.$$

$$S = \frac{a_1 + a_{15}}{2} \cdot 15 = \frac{a_1 + a_1 + 14d}{2} \cdot 15 = (2a_1 + 14) \cdot 15 =$$

$$= 15a_1 + 105$$

$$a_1^2 + 21a_1d + 90d^2 > 15a_1 + 105 - 24$$

$$a_1^2 + 6a_1 + 9 > 0$$

$$D_1 = 9 - 9 = 0 \quad (a_1 + 3)^2 > 0$$

$$a_1 \neq -3$$

$$a_1^2 + 21a_1 + 110 < 15a_1 + 105 + 4$$

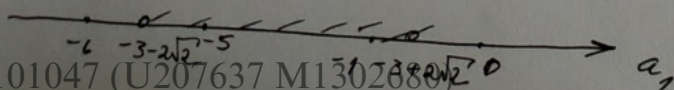
$$a_1^2 + 6a_1 + 1 < 0$$

$$D_1 = 9 - 4 = 5$$

$$a_1 = -3 + \sqrt{5}$$

$$a_1 = -3 - \sqrt{5}$$

$$a_1 \in (-3 - \sqrt{5}; -3 + \sqrt{5})$$



Математика,

11 класс, Числовые множества

$$\begin{cases} a_1 \neq -3 \\ a_1 \in \{-5; -4; -3; -2; -1\} \end{cases}$$

Ответ:  $\{-5; -4; -2; -1\}$ .

$$\begin{cases} (x-a)^2 + (y-b)^2 \leq 50 & (1) \\ a^2 + b^2 \leq \min(14a+2b, 50) & (2) \end{cases} \quad \omega_3.$$

$$2) \begin{cases} a^2 + b^2 \leq 14a + 2b & (1) \\ 14a + 2b < 50 & \\ \begin{cases} a^2 + b^2 \leq 50 & (2) \\ 50 \leq 14a + 2b \end{cases} \end{cases}$$

$$1) \begin{cases} (a-4)^2 + (b-1)^2 \leq 50 & - \omega_2 \\ 14a + 2b < b < -4a + 25 \end{cases}$$

Найдем точки пересечения:

$$(a-4)^2 + (-4a+24)^2 \stackrel{=}{\leq} 50$$

$$a^2 - 14a + 49 + 49a^2 - 336a + 576 - 50 = 0$$

$$50a^2 - 350a + 575 = 0$$

$$2a^2 - 14a + 23 = 0$$

$$D_1 = 49 - 46 = 3$$

$$a = \frac{7 \pm \sqrt{3}}{2}$$

$$b = \frac{49 \mp 7\sqrt{3}}{2}$$

$$2) \begin{cases} a^2 + b^2 \leq 50 & - \omega_1 \\ b \geq 25 - 4a \end{cases}$$

Точк. пересек.:

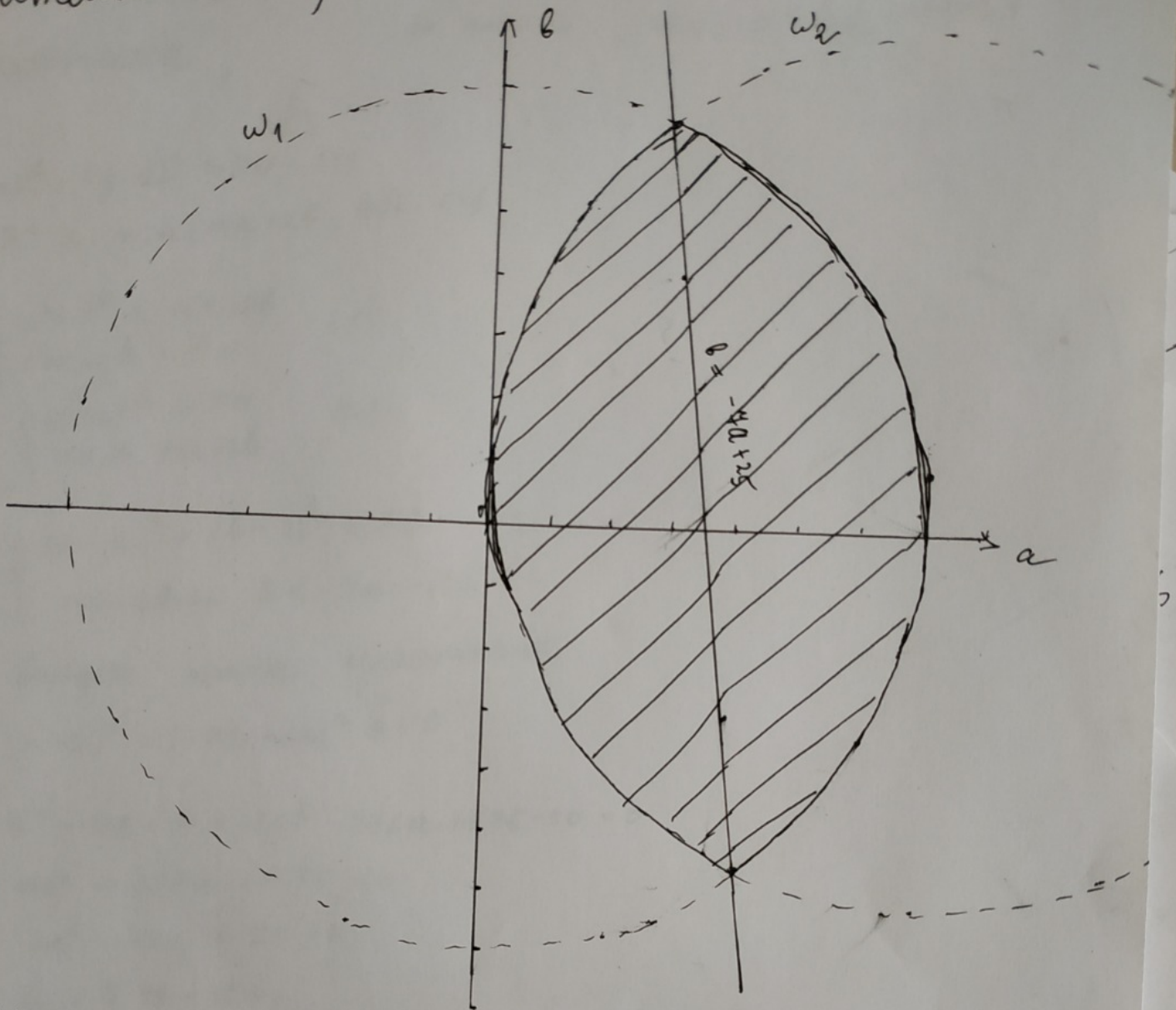
$$a^2 + 49a^2 - 350a + 625 - 50 = 0$$

$$50a^2 - 350a + 575 = 0$$

$$a = \frac{7 \pm \sqrt{3}}{2}$$

$$a \quad b = \frac{49 \mp 7\sqrt{3}}{2}$$

Математика, 11 класс, численик, лист 4.



Каждая точка  $(a; b)$  заштрихованной области - центр окружности в координатах  $(x; y)$  с радиусом  $\sqrt{50} = 5\sqrt{2}$ .

центр  $\omega_1 \in \omega_2$   $(10-4)^2 + (0-1)^2 = 50$

↓

центр  $\omega_2 \in \omega_1$

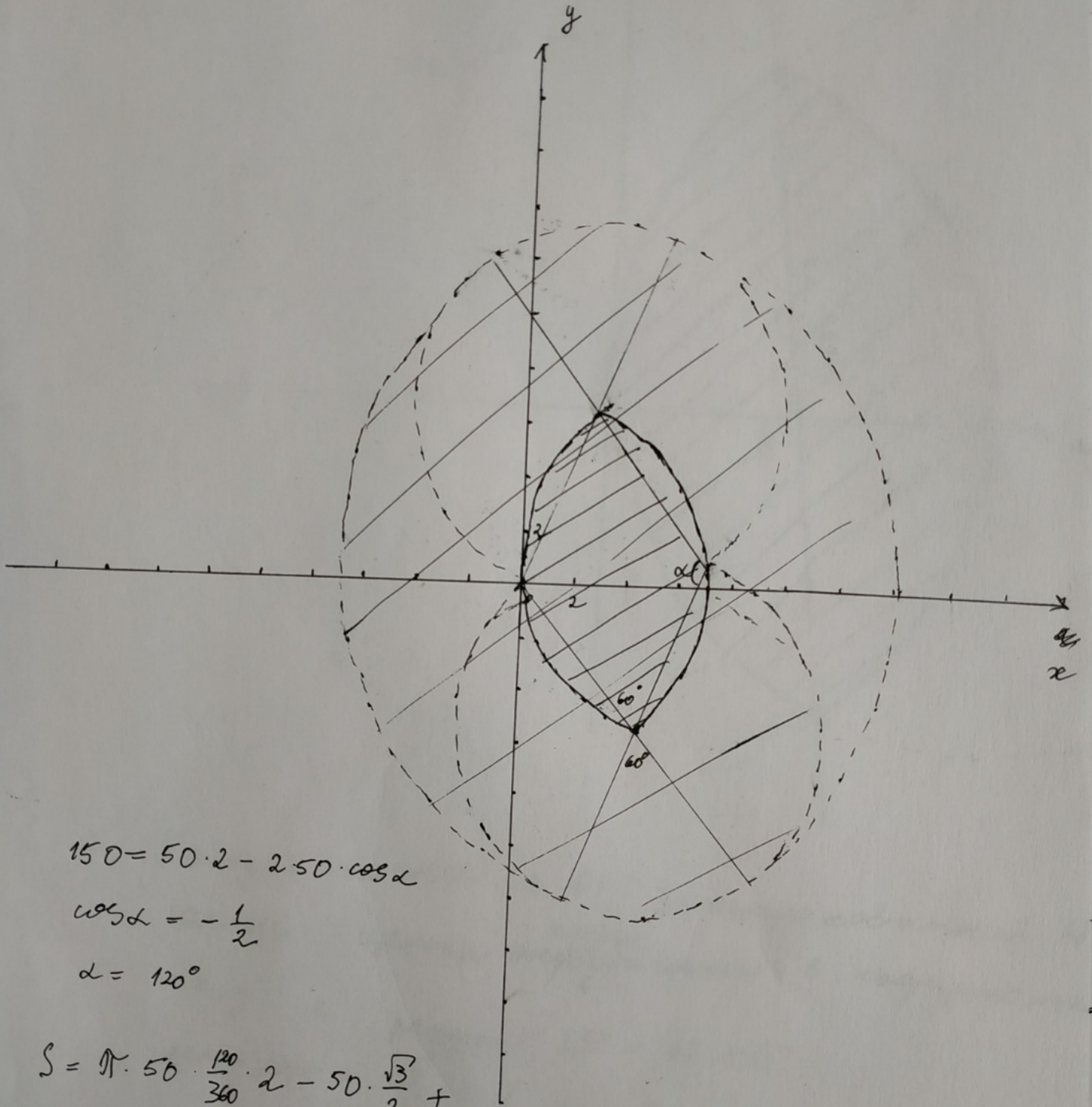
Расстояние между точками пересечения:

$$f^2 = \left( \frac{7+\sqrt{3}}{2} - \frac{7-\sqrt{3}}{2} \right)^2 + \left( \frac{49-4\sqrt{3}}{2} - \frac{49+4\sqrt{3}}{2} \right)^2 = 150$$

$$f = \sqrt{150} = 5\sqrt{6}$$

Математика, 11 класс, учебник, лист 5

см



$$150 = 50 \cdot 2 - 2 \cdot 50 \cdot \cos \alpha$$

$$\cos \alpha = -\frac{1}{2}$$

$$\alpha = 120^\circ$$

$$S = \pi \cdot 50 \cdot \frac{120}{360} \cdot 2 - 50 \cdot \frac{\sqrt{3}}{2} +$$

$$+ \pi \cdot 50 \cdot \frac{60}{360} \cdot 2 = 4\pi \cdot 50 \cdot \frac{2}{3} +$$

$$+ \pi \cdot 50 \cdot \frac{1}{3} - 50 \frac{\sqrt{3}}{2} =$$

$$= \pi \cdot 50 - 50 \frac{\sqrt{3}}{2} = 50 \left( \pi - \frac{\sqrt{3}}{2} \right)$$

Ответ:  $50 \left( \pi - \frac{\sqrt{3}}{2} \right)$

# Uproben

$$\begin{aligned} (a+4d) & \\ (a+6d)(a+15d) & > S-24 \\ (a+10d)(a+11d) & < S+4 \end{aligned}$$

$$\frac{+15}{6} \\ \frac{90}{90}$$

$$\left\{ \begin{aligned} \cancel{5 \cdot 14} & > \cancel{15 \cdot 6} \\ 5 \cdot 14 & > 15 \cdot 6 - 24 \end{aligned} \right.$$

$$\begin{cases} a^2 + 15ad + 6ad + 90d^2 > S-24 \\ a^2 + 11ad + 10ad + 110d^2 < S+4 \end{cases}$$

$$-1+6=5$$

$$-1+15=14$$

$$\begin{cases} a^2 + 21ad + 90d^2 > S-24 \\ -a^2 + 21d + 110d^2 > S+4 \end{cases}$$

$$0 > -3+2\sqrt{2}$$

$$3 > 2\sqrt{2}$$

$$4 > 8$$

$$-20d^2 > -28$$

$$d^2 < \frac{28}{20}$$

$$\frac{-1+13}{2} \cdot 15$$

$$d=1$$

$$\frac{+15}{7} \\ \frac{105}{105}$$

$$\begin{cases} a^2 + 21a + 90 > S-24 \\ a^2 + 21a + 110 < S+4 \end{cases}$$

$$-1 < -3+2\sqrt{2}$$

$$2 < 2\sqrt{2}$$

$$4 < 8$$

$$a^2 + 12a + 90 > \frac{a+a+14}{2} \cdot 15 = (a+7) \cdot 15 = 15a + 105$$

$$a^2 - 3a - 15 > 0$$

$$a \in \{-5; -4; -3; -2; -1\}$$

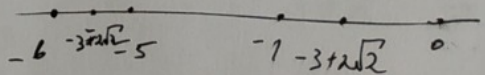
$$a^2 + 21a + 110 < 15a + 105 + 4$$

$$a^2 + 6a + 1 < 0$$

$$\Delta = 36 - 4 = 8$$

$$a = -3 + 2\sqrt{2}$$

$$\frac{+14}{2} \\ \frac{28}{28} \\ 3$$



$$a = -3 - 2\sqrt{2}$$

$$-3 - 2\sqrt{2}$$

<

$$-5$$

$$-2\sqrt{2}$$

<

$$-2$$

$$2\sqrt{2}$$

>

$$2$$

$$8$$

>

$$4$$

$$\frac{105}{81} \\ \frac{-24}{81} \\ \frac{81}{81}$$

$$\sqrt{150} = 5$$

$$\frac{4-4}{4-4}$$

$$4 + \sqrt{3} - 4 + \sqrt{3} = 2\sqrt{3}$$

$$3 + 4 \cdot 3 = 3 \cdot 50$$

$$\left(\sqrt{3}\right)^2 + \left(4\sqrt{3}\right)^2 =$$

# Чепровик

$a_4$

$$\begin{cases} a(a+9d) > S-24 \\ (a+4d)(a+5d) < S+4 \end{cases}$$

$$a^2 + 9ad > S-24$$

$$a^2 + 5ad + 4ad + 20d^2 < S+4$$

$$\begin{cases} -a^2 - 9ad < -S+24 \\ a^2 + 9ad + 20d^2 < S+4 \end{cases}$$

$$\begin{array}{r} +24 \\ \times 14 \\ \hline 168 \\ \times 2 \\ \hline 336 \end{array}$$

0

$$\frac{0+14}{2} \cdot 15$$

$$S = a_4^1$$

$$20d^2 < 28$$

$$d^2 < \frac{28}{20}$$

$$d = 1$$

$$a(a+9) > S-24$$

$$a^2 + 9a > S-24$$

$$a^2 + 9a < S-16$$

$$\begin{array}{r} -2400 \\ -20,25 \\ \hline 3,75 \end{array}$$

$$S < a^2 + 9a + 24$$

$$S > a^2 + 9a + 16$$

$$\begin{array}{r} 81 \\ -8 \\ \hline 1 \end{array} \quad \begin{array}{r} 4 \\ | 20,25 \end{array}$$

$$\frac{-9}{2} = -4,5 = -\frac{9}{2}$$

$$\begin{array}{r} 24 \\ 824 \\ \hline \end{array}$$

$$S\left(-\frac{9}{2}\right) = +\frac{81}{4} - \frac{81}{2} + 24 \frac{48}{576}$$

$$= 24 - \frac{81}{4} = 3,75$$

$$a^2 + 9a > S-24$$

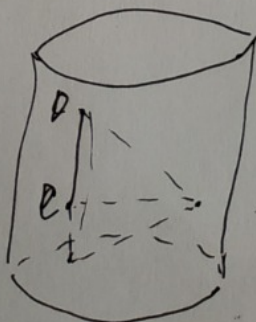
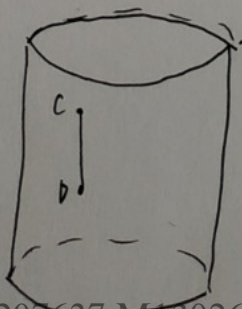
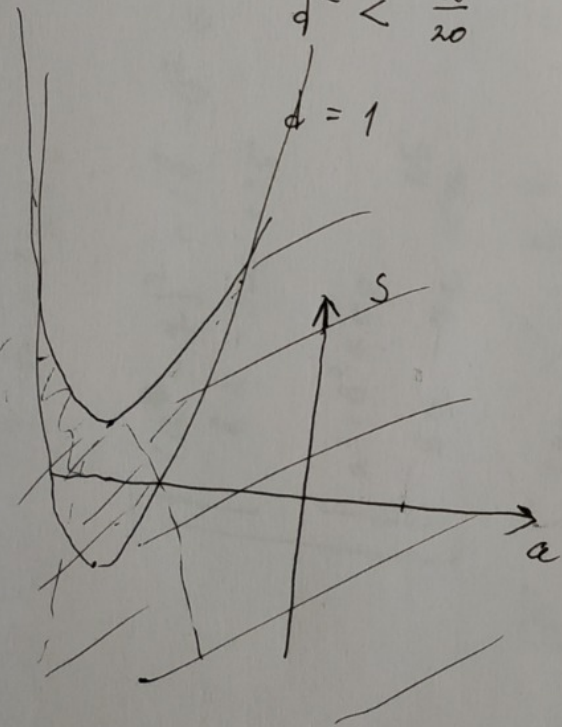
$$-a^2 - 9a > -S+16$$

$$5,35$$

$$\begin{array}{r} 8,00 \\ -3,75 \\ \hline -4,25 \end{array}$$

$$\begin{array}{r} 350 \\ -25 \\ \hline 106 \end{array} \quad \begin{array}{r} 25 \\ | 14 \end{array}$$

$$\begin{array}{r} 575 \\ -50 \\ \hline 75 \end{array} \quad \begin{array}{r} 25 \\ | 23 \end{array}$$





# Чепробен

$$11 \begin{cases} a^2 + b^2 \leq 14a + 2b \\ 14a + 2b < 50 \\ a^2 + b^2 \leq 50 \\ 14a + 2b \geq 50 \end{cases}$$

$$\begin{array}{r} 24 \\ 4 \\ \hline 168 \\ 2 \\ \hline 336 \\ + 14 \\ \hline 350 \end{array}$$

$$\begin{array}{r} 24 \\ + 24 \\ \hline 48 \\ 576 \\ \hline 275 \quad | \quad 5 \\ - 20 \\ \hline 45 \end{array}$$

$$\begin{array}{r} 350 \quad | \quad 25 \\ - 25 \\ \hline 100 \end{array}$$

70 +

$$\begin{aligned} (a-7)^2 + (b-1)^2 &= 50 \\ a^2 - 14a + 49 + b^2 - 2b + 1 &= 50 \\ 50a^2 - 350a + 575 &= 0 \end{aligned}$$

$$a^2 + 49a^2 + 700a + 2500 - 50 = 0$$

$$50a^2 + 700a + 2450 = 0$$

$$a^2 + 14a + 49 = 0$$

$$a = -4$$

$$b = 49$$

$$\begin{cases} a^2 + b^2 = 50 \\ b = -4a + 50 \end{cases}$$

$$a^2 + 49a^2 - 700a + 2500 - 50 = 0$$

$$a = 4$$

$$b = 1$$

$$\begin{array}{r} 575 \quad | \quad 25 \\ - 50 \\ \hline 45 \end{array} \quad | \quad 25 \\ \hline 123$$

$$2a^2 - 14a + 23 = 0$$

$$D = 49 - 46 = 3$$

$$a = \frac{7 \pm \sqrt{3}}{2}$$

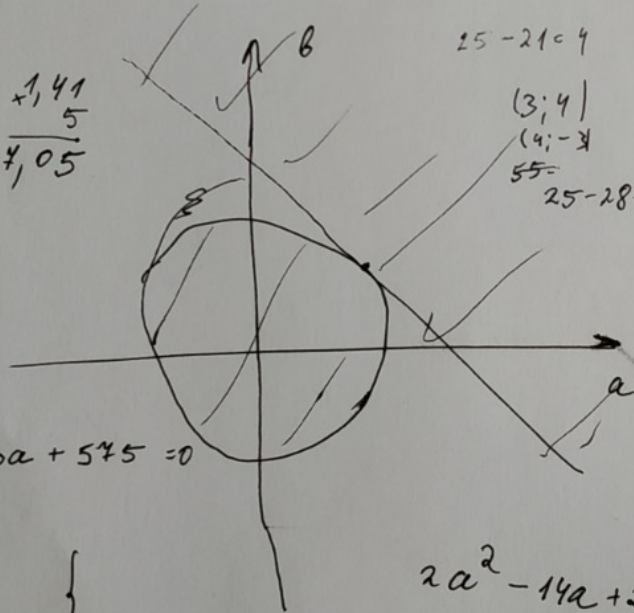
$$b = -24,5 \mp 3,5\sqrt{3} + 50 =$$

$$= 25,5 \mp 3,5\sqrt{3}$$

$$49 \mp 7\sqrt{3}$$

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$$\begin{array}{l} \sqrt{50} \quad +1,41 \\ 5\sqrt{2} \quad 7,05 \end{array}$$



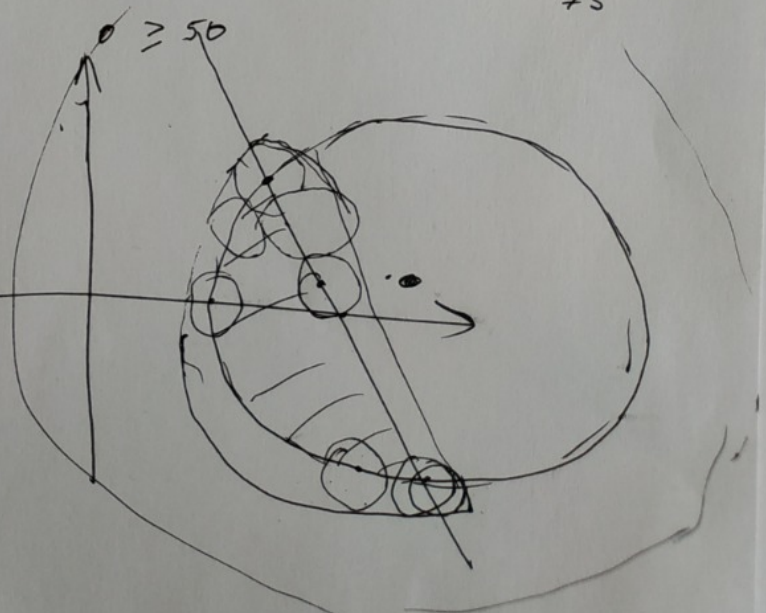
$$50a^2 - 350a + 575 = 0$$

$$\begin{cases} (7; 1) \end{cases}$$

$$\begin{array}{r} 79 \quad | \quad 2 \\ 4 \quad 24,5 \\ \hline 9 \end{array}$$

$$4 \cdot 50$$

$$\begin{array}{r} 25 \\ + 25 \\ \hline 50 \end{array}$$



# Часть 2

Олимпиада: **Математика, 11 класс (2 часть)**

Шифр: **21101047**

ID профиля: **207637**

Вариант 22

Мамедамура, 11 класс, Чирчобек, учим 1.

$$\log\left(\frac{x}{2}+1\right)^2\left(\frac{7x}{2}-\frac{14}{4}\right); \quad \log\sqrt{\frac{7x}{2}-\frac{14}{4}}\left(\frac{3x}{2}-6\right)^2; \quad \log\sqrt{\frac{3x}{2}-6}\left(\frac{x}{2}+1\right)$$

$$\left\{ \begin{array}{l} \frac{x}{2}+1 \neq 0 \\ \frac{x}{2}+1 \neq 1 \\ \frac{7x}{2}-\frac{14}{4} > 0 \\ \frac{7x}{2}-\frac{14}{4} \neq 1 \\ \frac{3x}{2}-6 \neq 0 \\ \frac{3x}{2}-6 > 0 \\ \frac{3x}{2}-6 \neq 1 \\ \frac{x}{2}+1 > 0 \end{array} \right. \quad \left\{ \begin{array}{l} x \neq 0 \\ x > \frac{14}{4} \\ x \neq 1,5 \\ x > 4 \\ x \neq \frac{14}{3} \\ x > -2 \end{array} \right.$$

$$x \in \left(4; \frac{14}{3}\right) \cup \left(\frac{14}{3}; +\infty\right)$$

$$\frac{x}{2}+1 = a; \quad \frac{7x}{2}-\frac{14}{4} = b; \quad \frac{3x}{2}-6 = c$$

$$a > 0, a \neq 1 \quad b > 0, b \neq 1 \quad c > 0, c \neq 1$$

$$\log_{a^2} b = 0,5 \log_a b \quad \text{m.k. } a > 0$$

$$\log_{b^{0,5}} c^2 = 4 \log_b c \quad \text{, m.k. } b, c > 0$$

$$\log_{c^{0,5}} a = 2 \log_c a \quad \text{, } c > 0$$

~~$$0,5 \log_a b = 4 \log_b c$$~~

~~$$\frac{\log_a b}{\log_b c} = 8 \quad \text{m.k. } \log_b c \neq 0 \quad (c \neq 1)$$~~

~~$$\frac{\log_a b}{\log_b c}$$~~

~~$$\log_a b = 8 \log_b c$$~~

Математика, 11 класс, Честовая, лист 2

$$\begin{cases} \log_a b = 8 \log_b c \\ 0,5 \log_a b = 2 \log_c a + 1 \end{cases}$$

$$b \neq 1 \Rightarrow \log_a b \neq 0$$

$$1 \cdot z = \frac{8 \log_b c}{2 \log_c a + 1}$$

$$4 \log_b c = 2 \log_c a + 1$$

$$4 \log_b c = 2 \cdot \log_c a^2 c$$

Заметим, что  $0,5 \log_a b \cdot 4 \log_b c \cdot 2 \log_c a = 4$

Обозначим числа через  $x, y, z$

$$\begin{cases} xyz = 4 \\ x = y \\ z = x - 1 \end{cases}$$

$$x^2 z = 4$$

$$x^2 (x-1) = 4$$

$$x^3 - x^2 - 4 = 0$$

$$\begin{cases} x^2 z = 4 \\ z = x - 1 \end{cases}$$

$$\begin{cases} wyz = 4 \\ w = y \\ z = w - 1 \end{cases}$$

$$\begin{cases} y^2 z = 4 \\ z = y - 1 \end{cases}$$

$$y = z + 1$$

$$(z+1)^2 z = 4$$

$$z^3 + 2z^2 + z - 4 = 0$$

1	2	1	-4
1	1	3	4
			0

$$z^2 + 3z + 4 = 0$$

$$D = 9 - 16 < 0$$

∅

$$z = 1$$

$$0,5 \log_a b = 1$$

$$\log_a b = 2$$

$$b = a^2$$

$$\frac{7x}{2} - \frac{17}{4} = \left(\frac{x}{2} + 1\right)^2$$

$$14x - 17 = (x+2)^2$$

$$14x - 17 = x^2 + 4x + 4$$

$$x^2 - 10x + 21 = 0$$

$$D_1 = 25 - 21 = 4$$

$$x = 5 \pm 2 = 7$$

$$x = 5 - 2 = 3 \text{ н.к.}$$

Математика, 11 класс, Честовик, мет 3.

$$2) 4 \log_6 c = 1 \Rightarrow 2 \log_c a = 2$$

$$\left(\frac{7x}{2} - \frac{17}{4}\right) = \left(\frac{3x}{2} - 6\right)^4$$

$$56x - 68 =$$

$$\log_c a = 1$$

$$\frac{x}{2} + 1 = \frac{3x}{2} - 6$$

$$x + 2 = 3x - 12$$

$$2x = 14$$

$$x = 7 \quad \text{при } x = 7$$

$$\left(\frac{7 \cdot 7}{2} - \frac{17}{4}\right) = \frac{81}{4}; \quad \left(\frac{3x}{2} - 6\right)^4 = \left(\frac{81}{4}\right)^2$$
$$\frac{81}{4} = \left(\frac{81}{4}\right)^2 \Rightarrow x \in \emptyset$$

$$3) 2 \log_c a = 1$$

$$\frac{3x}{2} - 6 = \left(\frac{x}{2} + 1\right)^2$$

$$3x - 6x - 24 = (x + 2)^2$$

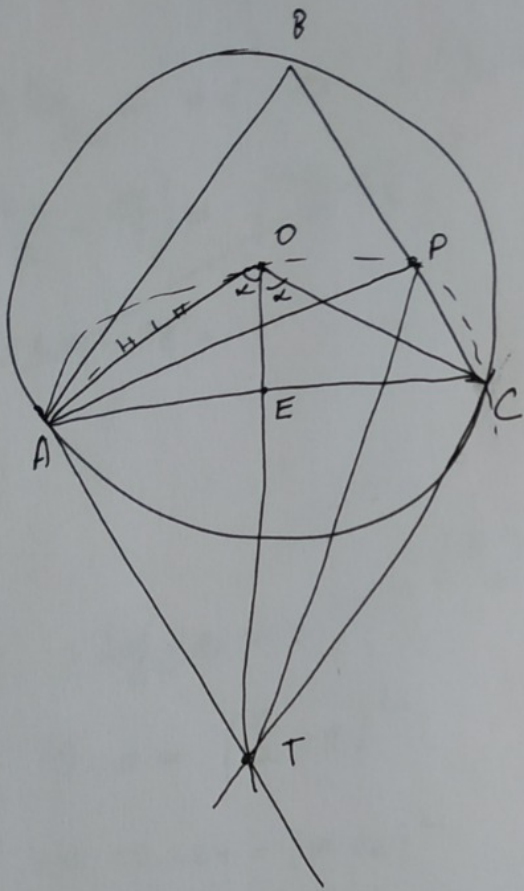
$$6x - 24 = x^2 + 4x + 4$$

$$x^2 - 2x + 28 = 0$$

$$D_1 = 1 - 28 < 0$$

Ответ: 7.

Числовик, 11 класс, Математика, лист 4  
 $\sqrt{6}$ .



$$A, O, P, C \in \text{окр.} \Rightarrow \angle AOC = \angle APC$$

$$\triangle AOT = \triangle TOC$$

$$\text{но } AT = TC$$

$$AO = OC = R$$

$$\angle OAT = \angle OCT = 90^\circ$$



$$\angle AOT = \angle TOC$$

$$\triangle AOC - \text{равноб.} \Rightarrow$$

OE - медиана  $\Leftrightarrow$

$$\frac{AK}{KC} = \frac{4}{5} \quad (S = \frac{1}{2} h l)$$

высоты к этим сторонам  
 из P равны

$$AK = 4x; \quad KC = 5x$$

$$AK + KC = 12x$$

$$AE = EC = 6x$$

Гепроек

$$\frac{21-12}{2} = 4.5$$

$$\log \frac{1}{5}$$

$$-6 < -\frac{17}{4}$$

$$24 > 14$$

$$1/2 \quad 2 \log \frac{3}{2}$$

$$0.5 \log \frac{18}{4}$$

$$4 \log \frac{3}{4}$$

$$\sqrt{\frac{7x}{2} - \frac{17}{4}} = \left| \frac{3x}{2} - 6 \right| = \frac{9}{4} x^2 - 18x + 36$$

$$x_0 = \frac{18 \pm 2}{2 \cdot 9} = 4$$

$$14x = 14$$

$$x = \frac{14}{14}$$

$$9 - 18 \cdot 4 + 36$$

$$\log_a b = 2$$

$$\frac{7x}{2} - \frac{17}{4} = \left( \frac{x}{2} + 1 \right)^2 - \frac{17}{4} = -\frac{27}{4}$$

$$0.25 \cdot 17 = \frac{3 \cdot 17}{4}$$

$$\frac{21}{2}$$

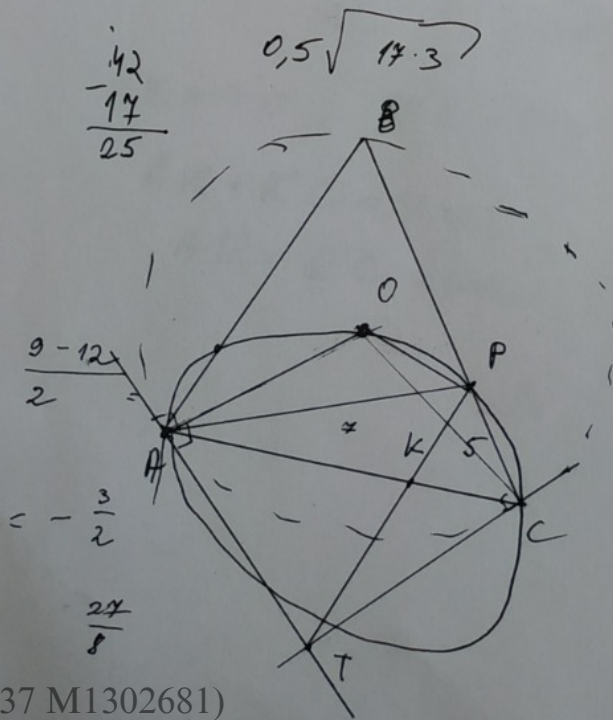
$$\frac{42-17}{4}$$

$$\frac{25}{4}$$

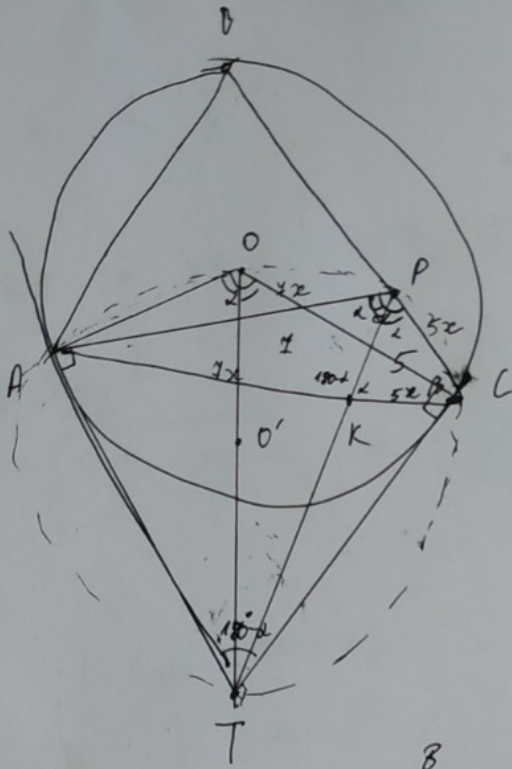
$$-\frac{3}{2}$$

$$\frac{25}{4}$$

$$\frac{27}{8}$$



reprodukt



$$\frac{4x^2}{\sin \alpha} =$$

$$\frac{0,5 \cdot 4x^2 \sin \alpha}{0,5 \cdot 5^2 \cdot x^2 \sin \beta} = \frac{4}{5}$$

$$4 \sin \alpha = 5 \sin \beta$$

$$180^\circ - \alpha - 180^\circ$$

5

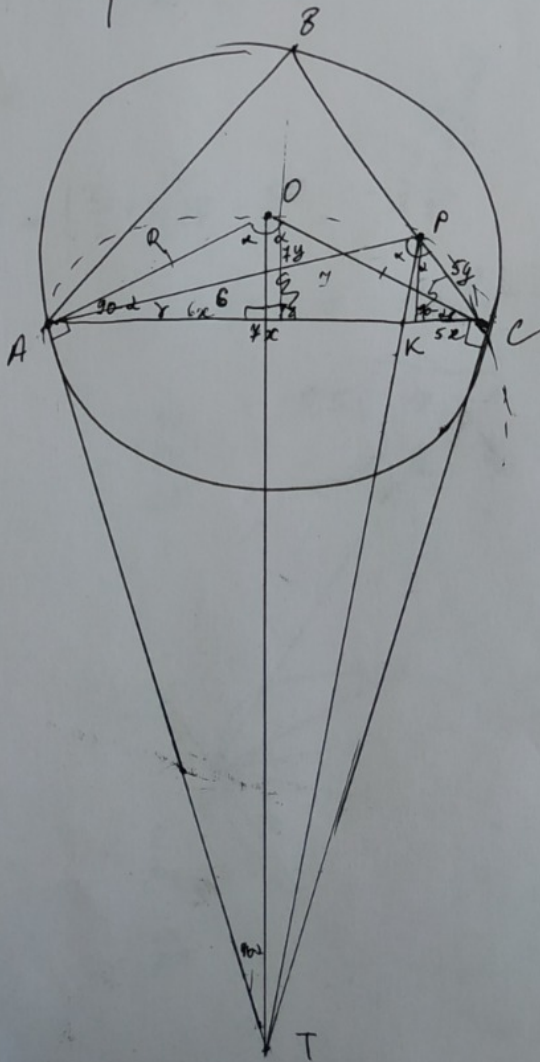
~~$$4924 \sin \alpha = 25 \sin \beta$$~~

$$4 \sin \alpha = 5 \sin \beta$$

$$\frac{5x}{\sin \alpha} = \frac{PK}{\sin \beta}$$

$$\frac{4x}{\sin \alpha} =$$

$$4924 \sin \alpha = 12$$





Yours...

Reprobus

$$0,5 \log_a b = \frac{2}{\log_a c}$$

$$\begin{array}{cccc} 1 & -1 & 0 & -4 \\ \hline +1 & -2 & 2 & \\ \hline -2 & 1 & -3 & \end{array}$$

$$\log_c a^2 + \log_c c$$

$$\begin{array}{cccc} 2 & 1 & 1 & \\ \hline 4 & 1 & 3 & 12 \\ \hline -4 & 1 & -5 & 20 \end{array}$$

$$\frac{4}{2}$$

$$\frac{3}{2}$$

$$\log_c a^2 c$$

$$2 = \frac{8 \log_c c}{\log_c a^2 c}$$

$$14x - 14 = 6x - 24$$

$$\begin{aligned} x^2 z &= 4 \\ z &= x - 1 \\ x &= z + 1 \\ (z+1)^2 z &= 4 \end{aligned}$$

$$1 = \frac{4}{\log_c a^2 c \cdot \log_c b}$$

$$8x = -4$$

$$x = -\frac{4}{8}$$

$$\begin{array}{ccc|ccc} 1 & -1 & 0 & -4 & & \\ \hline 0,5 & 1 & -0,5 & -0,5 & & \\ \hline & & & & & -0,5 \end{array}$$

$$1 = \frac{4}{\log_c a^2 b c}$$

$$\begin{array}{r} +144 \\ 9 \\ \hline 1296 \end{array}$$

$$\begin{array}{r} +144 \\ 12 \\ \hline \end{array}$$

$$4 = \log_c a^2 b c$$

$$3 \cdot 3^2 \cdot 12$$

$$3 = \log_c a^2 b$$

$$a^2 b = c^3$$

$$\begin{array}{r} \times 24 \\ 12 \\ \hline 54 \\ 24 \\ \hline 324 \end{array}$$

$$\left(\frac{x}{2} + 1\right)^2 \left(\frac{4x}{2} - \frac{14}{4}\right) = \left(\frac{3x}{2} - 6\right)^3 \quad | \cdot 16$$

$$\begin{array}{cccc} 1 & 1 & 1 & 1 \\ 1 & 1 & 3 & 2 \\ 4 & 1 & 1 & -4 \\ 0 & & & \end{array} \quad z^3 + 2z^2 + 2z - 4 = 0$$

$$(x+2)^2 (4x)$$

$$(x+2)^2 (14x-14) = 2(3x-12)^3$$

$$\begin{array}{r} \times 14 \\ 9 \\ \hline 68 \end{array}$$

$$(3x-12)^4$$

$$(x^2 + 4x + 4)(14x - 14) = 2(27x^3 - 324x^2 + 1296x - 81x^4 + 5184x^2)$$

$$4 \log_b c = 2 \log_c a + 1$$

$$81x^4 + 5184x^2$$

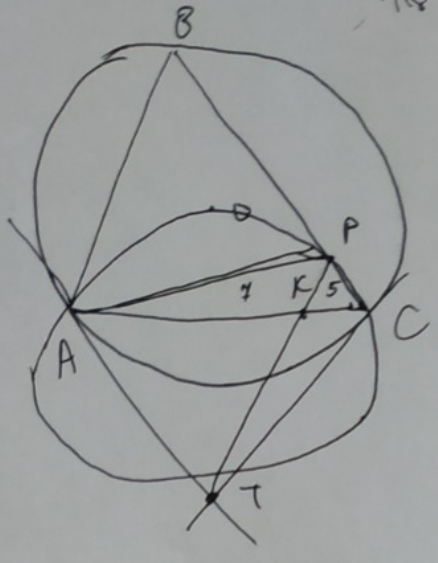
$$abc = 0,5 \log_a b \cdot 4 \log_b c \cdot 2 \log_c a =$$

$$\begin{cases} xy z = 4 \\ x = y \\ x = z = x - 1 \end{cases}$$

$$\begin{aligned} 4 & \left( \begin{array}{c} 1 \\ -5 \end{array} \right) \left( \begin{array}{c} 1 \\ 2 \end{array} \right) \left( \begin{array}{c} 1 \\ 2 \end{array} \right) \\ x^2 z &= 4 \\ x^2(x-1) & \end{aligned}$$

$$\begin{array}{r} \times 42 \\ 42 \\ \hline 144 \\ 504 \\ \hline 5184 \end{array}$$

Упражнение 1



$a, b, c$

$$\begin{cases} a = b \\ a - c = 1 \end{cases}$$

$(1; 1; 2)$  - positive  
 $(2; 1; 1)$

$$\frac{4 \cdot 4 \cdot 2 - 14}{4}$$

$$\frac{14 \cdot 4}{98} - \frac{14}{81}$$

$$2 \log_6 c = \log_c a$$

$$2 = \frac{\log_c a}{\log_6 c}$$

$$2 = \log_c a$$

$$\frac{9}{2}$$

$$\begin{aligned} 3x - 12 &> 0 \\ 3x &> 12 \\ x &> 4 \end{aligned}$$

$$\frac{14 \cdot 3}{42}$$

$$\frac{102}{102} \cdot \frac{1}{1} \cdot \frac{1}{4}$$

$$\log_{a^2} b \quad \log_{b^{0.5}} c^2 \quad \log_{c^{0.5}} a$$

$$2 \log \dots \left(\frac{x}{2} + 1\right) = x - 2$$

$$\log \frac{3x-6}{2} \left(\frac{x}{2} + 1\right) = 2$$

$$0.5 \log_a b$$

$$4 \log_6 c$$

$$2 \log_c a$$

$$0.5 \log_a b = 4 \log_6 c$$

$$\log_a b = 8$$

$$\frac{\log_a b}{\log_6 c} = 8$$

$$\log_c b = 8$$

$\Downarrow$

$$\log_6 c = \frac{1}{8}$$

$$4 \log_6 c = 0.5$$

$$\log_a b = 1$$

$$x + 2 > 0$$

$$\frac{14}{3} \quad 7 \quad 12$$

$$0.5 \log_a b = 2 \log_c a$$

$$\frac{\log_a b}{\log_c a} = 4$$

$$\log_a b = 4$$

$$\frac{36}{42}$$

$$\frac{7x}{2} - \frac{14}{4} = \frac{x}{2} + 1$$

$$14x - 14 = 2x + 4$$

$$12x = 18$$

$$x = \frac{3 \cdot 3}{8 \cdot 4} = 1.5109$$

$$\frac{34}{34}$$

$$\frac{259}{111} - \frac{1369}{1260}$$

$$\frac{140}{1260}$$

$$14x > 14$$

$$x >$$

$$2x + 4 = (3x - 12)^2$$

$$2x + 4 = 9x^2 - 72x + 144$$

$$9x^2 - 74x + 140$$